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## PATENT SPECIFICATION

DRAWINGS ATTACHED

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## Improvements in or relating to collimating view finders for photographic cameras.

### COMPLETE SPECIFICATION

We, ERNST LEITZ GESELLSCHAFT MIT BESCHRANKTER HAFTUNG, of Wetzlar, Germany, a joint stock Company organized under the laws of the Federal Republic of Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to collimating view finders for photographic cameras. The expression "view finder" as used herein is intended also to embrace a combined view and range finder. Collimating view finders have been proposed comprising means for providing an imaged indication delimiting the image field of the finder in the field of view of the finder, the indication being imaged into said field of view by a reflex viewer. Such indications may be provided for different objective focal lengths. With such a view finder, the delimiting indications are imaged from markings on a marking plate, which if desired is displaceable in its plane in dependence on the focusing movement of the objective for the purpose of compensating the finder parallax.

Such finders have stationarily arranged optical members which do not admit an adaptation to different distances of objects to be photographed. Consequently, the image field delimiting indications correctly correspond to the image field of the camera only for a predetermined distance of an object to be photographed. For all other distance settings of the objective a difference exists between the image field embraced in fact by the objective and the image field indicated by the image field delimiting indications in the finder, which leads to so-called "image field contraction". If it is assumed that for the infinity setting of the objective, the image field delimiting indications show, in the finder, a finder image field which equals the

field that in fact is embraced by the objective, then for all other distance settings of the objective, the image field shown in the finder is larger than that actually embraced by the objective. Thus it is not apparent whether all the details of the object lying near image field delimiting indications in the finder and visible in the finder are actually photographed on exposure.

It is an object of the invention to provide a view finder in which this "image field contraction" is compensated at least to a considerable extent.

The invention consists in a collimating view finder for a photographic camera, comprising means for imaging in the field of view of the finder an indication delimiting the image field of the finder, the indication being imaged by reflection into the field of view from a marking carried on marking plate, a transparent plate being arranged between the marking plate and the optical system of the viewer and having a deviating wedge-shaped portion arranged in a position adjacent to and parallel with the marking carried by the marking plate, the transparent plate being adjustable in its axial spacing from the marking plate in dependence on the focusing distance set on the objective of the camera so as to vary the size of the delimiting indication in accordance with the focusing distance.

The marking plate may have a plurality of markings, for providing indications delimiting a plurality of different image fields matched to image fields of objectives of different focal lengths, the transparent plate having a corresponding plurality of deviating wedge-shaped portions arranged in positions corresponding to the markings of the marking plate. It will be appreciated that the "image field contraction" is optically compensated on setting of the transparent plate relative to the marking plate, according to the focusing setting of the objective, as a

result of the suitably chosen refractive power of the transparent plate, that is, the combined effect of the material of, and the angle of, the wedge. Depending on the distance of the wedges from the marking plate, the field enclosed by the image field delimiting indications is of a different size than would be on observation without the effect of the deviating wedges.

- 10 The markings carried by the marking plate may be in the form of frame-like line slits, the deviating wedge portions of the transparent plate being in the form of wedge-like profiled frames arranged with the centres of the frames coinciding. Means may be provided for automatically displacing the transparent plate in the direction perpendicular to the marking plate and in dependence on the focussing setting of the camera objective.
- 15 The displacing means may comprise a member coupled to the transparent plate and operatively connected to a lever for setting an optical deviating member of a range finder part of the view finder, the deviating member being movable by setting the camera objective focusing distance. In this case the refractive power of the deviating wedges should be such that for each focusing setting of the objective, the correct image field is seen in the finder.

- 20 The marking plate may be displaceable in its own plane for compensating parallax of the finder, the marking plate and the transparent plate being arranged in a displaceable holder for joint lateral movement, the transparent plate being guided in the holder for displacement perpendicular to the marking plate.

- 25 The displacing means may be connected to a lever for compensating parallax of the finder. When for compensating the finder parallax the marking plate is displaceable in its own plane, then also the transparent plate carrying the deviating wedges has to follow this movement, notwithstanding its capability of being axially displaced relative to the marking plate.

- 30 The transparent plate may be a casting of glass or transparent synthetic material. The transparent plate may be coloured for constituting a contrast filter for the indication or indications delimiting the image field. For facilitating use of the finder under unfavourable illumination conditions, the marking plate may be provided, at its illumination side, with a deviating wedge or wedges, positioned in front of the marking or markings thereof, and having a deviating action opposite to that of the deviating wedge or wedges of the transparent plate. Alternatively the marking plate may be provided, at its illumination side, with a collecting lens.

- 35 The wedge or each wedge provided at the illumination side of the marking plate, or the collecting lens, may be secured to the mark-

ing plate. Advantageously the wedge or each wedge or the collecting lens is cemented to the marking plate.

A centrally apertured covering member, as disclosed in our patent specification No. 746,674, may be provided which is displaceable in its plane and arranged with auxiliary apertures each in register with a marking of the marking plate so that, in each case, only those markings required are visible, the wedges or each wedge provided at the illumination side of the marking plate or the collecting lens being secured to the covering plate.

In order to make the invention clearly understood reference will now be made to the accompanying drawings which are given by way of example and in which:—

Fig. 1 diagrammatically illustrates a combined view finder and range finder, the range finder being coupled with an exchangeable camera objective;

Fig. 2 diagrammatically illustrates part of the finder of Fig. 1, to a larger scale than Fig. 1; and

Fig. 3 illustrates a view, from behind of a wedge plate and its guide means, when the finder is set in an infinity position.

Fig. 1 shows an exchangeable objective 1 which is rotatable and axially displaceable for the purpose of focusing a photographic camera (not shown). The objective 1 is coupled by means of a setting cam 2 to a sensing lever 3a of a range finder arrangement. The range finder arrangement comprises an optical system 4, 5 of the view finder, optical mixing members 6a, 6b with a semi-transparent reflecting surface 6c, deviating prisms 7, 8, 9, a movable telescope objective 10, and additionally arranged lenses 4a, 4b in the path of the light rays. The telescope objective 10 forms an intermediate image in an intermediate image plane in which a marking plate 11 is provided, the intermediate image being viewed by means of the optical system 4, 4a, 4b. Simultaneously this optical system 4, 4a, 4b serves for viewing markings carried by the marking plate 11, the markings forming indications delimiting the image field of the finder. The setting of the range finder is effected by turning the objective 10. The turning is effected in dependence on the setting of the camera objective 1, by a lever arm 3b connected to the sensing lever 3a. For the purpose of compensating the finder parallax, the marking plate 11 is arranged displaceably in its own plane. The displacement is effected likewise in dependence on the setting of the camera objective 1 by a lever arm 3c connected to the sensing lever 3a.

In Figs. 1 and 2 the displacement of the marking plate 11 in its own plane is shown as being effected in a direction parallel to the

plane of the said Figures. This is effective for compensating the finder parallax if it is assumed that the two optical axes of the finder and the optical axis of the camera objective lie in one plane. Generally, however, the optical axis of the objective lies in a different plane to the optical axes of the finder and it is necessary that the direction of displacement of the marking plate be as shown by the arrow in Fig. 3 in order to compensate finder parallax with regard to both vertical and horizontal limits of the finder.

Parallel to the marking plate 11 a wedge plate 12 of transparent material is arranged. The wedge plate 12 has wedge elements 12a, 12b, 12c arranged in a concentric frame-like manner. The wedge plate is displaceable axially relative to the marking plate 11, in a guide 13 of a support 14 carrying the marking plate 11.

The axial displacement is effected by means of links 15 (Figs. 1 and 3) which are connected to the lever arm 3b. The carrier 14 for the marking plate 11 and the guide 13 for the wedge plate 12 is mounted in guides 18 for enabling displacing of the marking plate 11 and the wedge plate 12 in their respective planes for the purpose of compensating the finder parallax. This displacement is effected by means of the lever arm 3c in dependence on the setting of the camera objective.

In the marking plate 11 markings in the form of translucent line slits 11a, 11b, 11c arranged in frame-like manners are provided for indicating the image field limits. The marking plate 11 furthermore has a central window 11d for passage of range finder rays from prisms 8. The lines 11a, 11b, 11c are interrupted at the corners of the frames to such an extent that when they are viewed through the wedge elements 12a, 12b, 12c allocated to them, only when the objective 1 has been set to the shortest focusing distance do they result in an image of a closed frame, as shown in Fig. 3 by the broken lines 11a', 11b', 11c'. This interruption of the line slits 11a, 11b, 11c at the corners of the frames is provided in order to avoid an intersection of the lines at the corners of the frames during an intermediate setting of the wedge plate 12.

The illumination of the lines 11a, 11b, 11c of the marking plate 11 is effected through an illumination window arranged at the front of the camera so that the delimiting lines appear by diffusely transmitted light. However alternatively a marking plate arranged for illumination by diffusely reflected light may be provided. On illuminating the marking plate 11 through the window at the front of the camera it may happen that for constructional reasons the size of the illuminating window has to be kept compara-

tively small so that then on setting the wedge plate 12 to its greatest compensating position, the camera casing surrounding the illumination window may to some extent mask the marking plate. This can happen especially when viewing the lines 11a delimiting the largest possible image field. For this case either a light collecting illuminating lens 16 may be provided in front of the entire marking plate, as indicated in dash dotted lines in Fig. 1, or wedge elements 17 indicated in dash dotted lines in Fig. 2 may be provided merely in front of the lines 11a delimiting the largest image field.

The illuminating lens 16 or the wedge elements 17 are secured to the marking plate 11. When however there is allocated to the marking plate 11 a covering member as disclosed in our aforementioned specification No. 746,674 and which is displaceable relatively to the marking plate and which serves to render visible only those lines delimiting the image field which correspond to the objective attached to the camera in each case, then preferably the illuminating lens 16 or the wedge elements 17 are secured to this covering member and are displaceable jointly therewith.

The invention has been described by reference to a combined view finder and range finder. The invention may however alternatively be easily applied to a view finder arrangement in which indications delimiting the image field of the finder are imaged into the path of light rays of the finder, independently of the presence or absence of a range finder. For the purpose of displacing the wedge plate 12 however, it is simpler if a displaceable member is already present for a simultaneously provided range finder.

For transferring the setting movements onto the telescopic objective 10 and the marking plate 11, lever arms 3b, 3c connected to the sensing lever 3a have been shown in the illustrated embodiment. Alternatively however instead of levers, other translating means may be provided which are suited to the conditions prevailing in particular cameras. Also the specific construction of the range finder may be changed without affecting the present invention. Thus for example instead of moving the telescope objective 10, alternatively the prism 9 could be moved. Again, by using bifocal lenses for the members 4a and 4b the range finder construction may be such that no intermediate imaging of the range finder image takes place. Finally to compensate the parallax of the finder, instead of displacing the marking plate 11 in the path of the light beam of the finder, an adjustable optical wedge, known in the art as an Abbat or Boscowitch wedge, may be provided in the path of the light beam of the finder, the wedge

being adjustable in dependence on the setting of the camera objective.

# WHAT WE CLAIM IS:

1. A collimating view finder for a photographic camera, comprising means for imaging in the field of view of the finder an indication delimiting the image field of the finder, the indication being imaged by reflection into the field of view from a marking plate carried by a marking plate, a transparent plate being arranged between the marking plate and the optical system of the viewer and having a deviating wedge-shaped portion arranged in a position adjacent to and parallel with the marking carried by the marking plate, the transparent plate being adjustable in its axial spacing from the marking plate in dependence on the focusing distance set on the objective of the camera so as to vary the size of the delimiting indication in accordance with the focusing distance.
2. A view finder as claimed in claim 1, wherein the marking plate has a plurality of markings for providing indications delimiting a plurality of different image fields matched to image fields of objectives of different focal lengths, the transparent plate having a corresponding plurality of deviating wedge portions arranged in position corresponding to the markings of the marking plate.
3. A view finder as claimed in claim 2, wherein the markings carried by the marking plate are in the form of frame-like line slits, the deviating wedge portions of the transparent plate being in the form of wedge-like profiled frames arranged with the centres of the frames coinciding.
4. A view finder as claimed in claim 1, 2 or 3, wherein means are provided for automatically displacing the transparent plate in the direction perpendicular to the marking plate and in dependence on the focusing setting of the camera objective.
5. A view finder as claimed in claim 4, wherein the displacing means comprises a member coupled to the transparent plate and operatively connected to a lever for setting an optical deviating member of a range finder part of the view finder, the deviating member being movable through lever means when setting the camera objective focusing distance.
6. A view finder as claimed in any one of claims 1 to 5, wherein the marking plate is displaceable in its own plane for compensating parallax of the finder, the marking plate and the transparent plate being arranged in a displaceable holder for joint lateral movement, the transparent plate being guided in the holder for displacement per-

pendicular to the marking plate.

7. A view finder as claimed in claim 6, wherein the lateral displacing means are operatively connected to a lever for compensating parallax of the finder.

8. A view finder as claimed in any one of claims 1 to 7, wherein the transparent plate is a casting of glass or transparent synthetic material.

9. A view finder as claimed in any one of claims 1 to 8, wherein the transparent plate is coloured for constituting a contrast filter for the indication or indications delimiting the image field.

10. A view finder as claimed in any one of claims 1 to 9, wherein the marking plate is provided, at its illumination side, with a deviating wedge or wedges, positioned in front of the marking or markings thereof, and having a deviating action opposite to that of the deviating wedge or wedges of the transparent plate.

11. A view finder as claimed in any one of claims 1 to 9, wherein the marking plate is provided at its illumination side with a collecting lens.

12. A view finder as claimed in claim 10 or 11, wherein the wedge or each wedge or the collecting lens provided at the illumination side of the marking plate is secured to the marking plate.

13. A view finder as claimed in claim 12, wherein the wedge or each wedge or the collecting lens is cemented to the marking plate.

14. A view finder as claimed in claim 10 or 11, wherein a centrally apertured covering member having auxiliary apertures each in register with a marking of the marking plate is provided which is displaceably in its plane and arranged so that, in each case, only those markings of the marking plate required are visible, the wedge or each wedge provided at the illumination side of the marking plate or the collecting lens being secured to the covering plate.

15. A collimating view finder constructed, arranged and adapted to operate substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawings.

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